MI FluFocus

Influenza Surveillance and Avian Influenza Update

Bureau of Epidemiology
Bureau of Laboratories

Michigan Department of Community Health
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New updates in this issue:

- **Michigan Surveillance:** Influenza surveillance data shows elevated but decreasing activity.
- **National Surveillance:** Activity decreased slightly; 46 states still at widespread activity.
- **International Surveillance:** The winter flu season may be peaking in parts of North America but is intensifying across much of Europe and Central and Eastern Asia.

******2009 Influenza A (H1N1) virus Updates******

On August 17 and September 18, MDCH released guidance for healthcare providers, laboratorians and public health personnel regarding appropriate patients for influenza testing at the MDCH lab and reporting of influenza hospitalizations and deaths. The guidance is available at www.michigan.gov/h1n1flu.

Please continue to reference the State of Michigan's novel 2009 influenza A (H1N1) website at www.michigan.gov/h1n1flu and the MDCH influenza website at www.michigan.gov/flu for additional information. Local health departments can find guidance documents in the MI-HAN document library. In addition to the previous websites, additional laboratory-specific information is located at the Bureau of Laboratories H1N1 page at http://www.michigan.gov/mdch/0,1607,7-132-2945_5103-213906--,00.html.

International (WHO H1N1 2009 update 74 [edited], November 13): The winter influenza season, which began unusually early across much of the Northern Hemisphere, shows early signs of peaking in parts of North America but is intensifying across much of Europe and Central and Eastern Asia.

In North America, Canada reported sharp increases in rates of influenza-like-illness (ILI), detections of pandemic H1N1 virus, and school outbreaks over the past three weeks as pandemic activity continues to spread west to east. In the United States, influenza transmission remains geographically widespread and intense but largely unchanged since the previous reporting week; rates of hospitalizations among persons aged 0-4 years, 5-17 years, and 18-49 years have now exceeded those seen during recent previous influenza seasons. Disease activity may have peaked in the earlier affected southern and south eastern parts of the United States. In Mexico, influenza activity remains geographically widespread with a significant wave of cases reported since early September, most notably from central and southern Mexico.

In Europe and Central Asia, overall influenza transmission continues to intensify throughout the continent as pandemic activity spreads eastward. At least 10 countries of Western Europe (Iceland, Poland, Romania, Belgium, Germany, the Netherlands, Norway, Spain, Sweden and the United Kingdom) now report that the proportion of sentinel samples testing positive for influenza exceeded 20% consistent with active circulation of pandemic influenza viruses. High to very high intensity of respiratory diseases with concurrent circulation of pandemic H1N1 2009 was also reported in the Netherlands, Italy, much of Northern Europe, Belarus, Bulgaria, and in the Russian Federation (particularly in the Urals). Disease activity may be peaking in a few countries, notably Iceland, Ireland, and parts of the UK (Northern Ireland) that experienced intense transmission during early autumn. Because of a sharp rise in pandemic influenza cases one week ago in Ukraine, the Ministry of Health requested assistance from WHO European Regional Office to evaluate and respond. The initial analysis of information indicates that the numbers of severe cases do not appear to be excessive when compared to the experience of other countries and do not represent any change in the transmission or virulence of the virus.

Over 99% of subtyped influenza A viruses in the Europe were pandemic H1N1 2009 with the exception of the Russian Federation where <10% of viruses subtyped were seasonal influenza subtypes, H3N2 and seasonal H1N1.

In Western Asia, increasing activity has been observed in several countries. In Israel, sharp increases in rates of ILI and pandemic virus detections have been observed over the past 3 weeks. In Afghanistan, the proportion of sentinel visits for acute respiratory infections (ARI) has increased over the past 3-4 weeks, but more dramatically in the last 1-2 weeks.

In East Asia, very intense and increasing influenza activity continues to be reported in Mongolia with a severe impact on the healthcare system. In China, the proportion of sentinel hospital visits for ILI and the proportions of respiratory samples testing positive for influenza, continued to increase over the past 3-4 weeks. More than 80% of influenza viruses isolated in China were pandemic H1N1 2009. In Hong Kong SAR, rates of ILI have returned baseline after a recent wave of predominantly pandemic H1N1 influenza in September and October. In Japan, sharp increases in influenza activity continue to be reported nationally. On northern island of Hokkaido, which to date has been the most heavily affected, disease activity may have recently peaked.

Although active, predominantly pandemic influenza transmission persists in the Caribbean region, disease activity may have recently peaked in some places as evidenced by recently declining rates of ARI and severe acute respiratory infections (SARI) in the Caribbean Epidemiology Centre (CAREC) countries. Most other countries in the tropical region of Central and South America continue to report declining influenza activity.

With the exception of Nepal and Sri Lanka, overall transmission continues to decline in most parts of South and Southeast Asia.

In the temperate region of the southern hemisphere, little pandemic influenza activity has been reported in recent weeks. Of note, a cluster of pandemic influenza cases been reported in Argentina in the capital area.

The countries and overseas territories/communities that have newly reported their first pandemic (H1N1) 2009 confirmed cases since the last web update (No.73): Somalia, Nigeria, and Burundi. The countries and overseas territories/communities that have newly reported their first deaths among pandemic (H1N1) 2009 confirmed cases since the last web update (No 73): Saint Lucia.

Region – Cumulative total as of 8 November 2009		
	Cases*	Deaths
WHO Regional Office for Africa (AFRO)	14868	103
WHO Regional Office for the Americas (AMRO)	190765	4512
WHO Regional Office for the Eastern Mediterranean (EMRO)	25531	151
WHO Regional Office for Europe (EURO)	over 78000	at least 300
WHO Regional Office for South-East Asia (SEARO)	44661	678
WHO Regional Office for the Western Pacific (WPRO)	149711	516
Total	over 503536	at least 6260

*Given that countries are no longer required to test and report individual cases, the number of cases reported actually understates the real number of cases.

******Influenza Surveillance Reports******

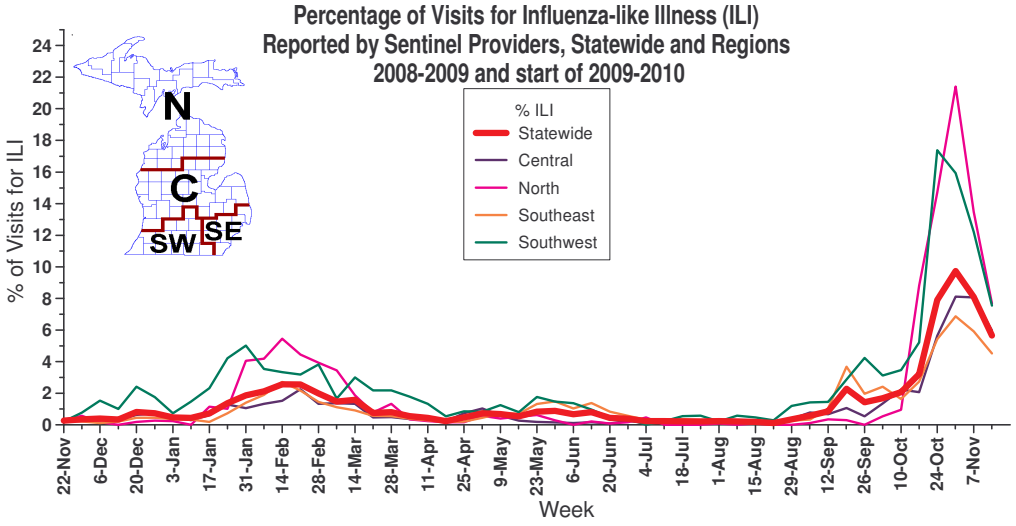
Michigan Disease Surveillance System: The week ending November 14 saw aggregate flu-like, individual influenza, and 2009 novel H1N1 case reports decrease from the previous week's levels. Cases reported this week are notably higher than what was seen during the identical week of the previous year.

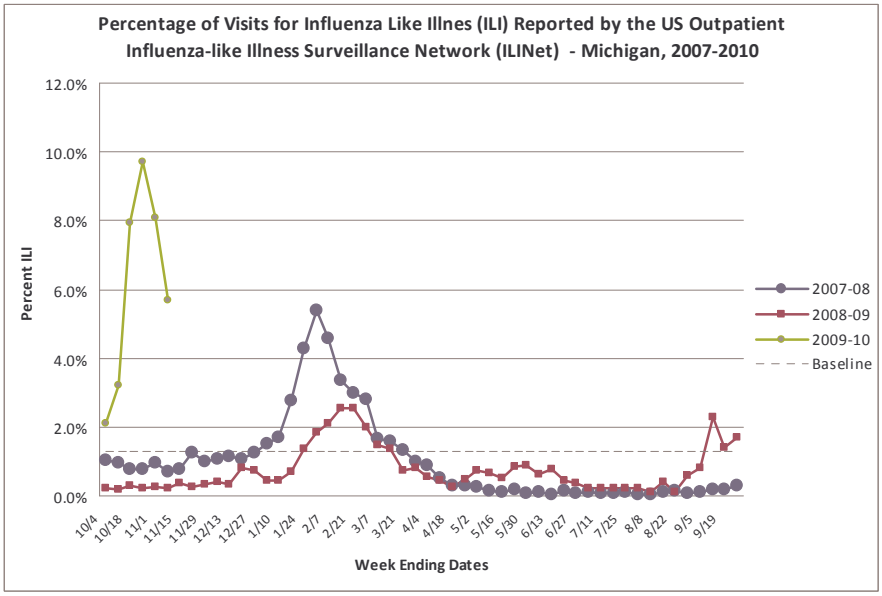
During the week of November 8-14, 2009, 26,868 cases of flu-like illness and confirmed and probable cases of seasonal and novel influenza were reported in Michigan. 368 hospitalizations and 7 deaths associated with influenza were also reported during this time. This report is updated every Tuesday by 5:00 pm and can be accessed at a link on this website: http://www.michigan.gov/h1n1flu.

Emergency Department Surveillance: Emergency department visits from both constitutional and respiratory complaints were slightly lower than last week's levels. Both constitutional and respiratory complaints are higher compared to what was seen this time last year. There were no constitutional alerts generated last week. Two respiratory alerts were generated in the C(1) and N(1) Influenza Surveillance Regions last week.

Over-the-Counter Product Surveillance: Overall, OTC product sales were mixed. Thermometer sales saw a slight decrease in sales compared to the previous week. The remainder of the indicators held steady near the previous weeks' sales numbers. All sales indicators, with the exception of thermometer sales, which are slightly higher, are comparable to levels seen at this time last year.

Sentinel Provider Surveillance (as of November 19, 2009): During the week ending November 14, 2009, the proportion of visits due to influenza-like illness (ILI) decreased to 5.7% overall; 818 patient visits due to ILI were reported out of 14,475 office visits. Forty-three sentinel sites provided data for this report. Activity decreased in all four surveillance regions: Central (6.0%), Southeast (4.5%), Southwest (7.5%) and North (7.7%). Please note that these rates may change as additional reports are received.





As part of pandemic influenza surveillance, CDC and MDCH highly encourage year-round participation from all sentinel providers. New practices are encouraged to join the sentinel surveillance program today! Contact Cristi Carlton at 517-335-9104 or CarltonC2@michigan.gov for more information.

Laboratory Surveillance (as of November 14): During the week of November 8-14, MDCH Bureau of Laboratories identified 65 novel H1N1 influenza A and 12 unsubtypeable influenza A isolates. For the 2009-2010 season (starting on October 4, 2009), MDCH BOL has identified 497 influenza isolates:

- Novel Influenza A (H1N1): 479
- Influenza A unsubtypeable: 17
- Influenza B: 1

16 sentinel labs reported for the week ending November 14, 2009. 2 labs reported continued increasing influenza A positives (SE), 6 labs had decreasing or sustained moderate levels of A positives (SE, SW, C, N), 6 labs reported decreasing low numbers of Flu A positives (SW,C, N), and 2 labs reported no flu A positives (C, N). 2 labs reported sporadic influenza B positives (SE, N).

Michigan Influenza Antigenic Characterization (as of November 20): One novel H1N1 influenza A virus from Michigan has undergone further characterization at the CDC. This virus was characterized as A/California/07/2009 (H1N1)-like, which is the recommended strain for the H1 component of the 2010 Southern Hemisphere vaccine.

Michigan Influenza Antiviral Resistance Data (as of November 20): Results are currently not available for antiviral resistance at CDC for the 2009-2010 season.

Antiviral resistance testing takes months to complete and cannot be used to guide individual patient treatment. However, CDC has made recommendations regarding the use of antivirals for treatment and prophylaxis of influenza. The guidance is available at http://www.cdc.gov/H1N1flu/recommendations.htm.

Influenza-Associated Pediatric Mortality (as of November 20): Four influenza-associated pediatric mortalities (SE(2), SW, N) associated with novel H1N1 influenza has been reported to MDCH for the 2009-2010 influenza season.

***CDC has asked states for information on any pediatric death associated with influenza. This includes not only any pediatric death (<18 years) resulting from a compatible illness with laboratory confirmation of influenza, but also any unexplained pediatric death with evidence of an infectious process. Please immediately call MDCH to ensure proper specimens are obtained. View the complete MDCH protocol online at http://www.michigan.gov/documents/mdch/ME_pediatric_influenza_guidance_v2_214270_7.pdf.

Influenza Congregate Settings Outbreaks (as of November 20): Six congregate setting outbreaks with confirmatory novel influenza A H1N1 testing (1SE, 3 SW, 1C, 1N), and two outbreaks associated with positive influenza A tests (1C, 1N) have been reported to MDCH for the 2009-2010 influenza season. These are 7 school facilities and 1 long term care facility.

As of 9:00am on November 20, 563 influenza-related school and/or district closures in Michigan (Public Health Preparedness Region 1 - 54, Region 2N - 4, Region 2S – 8, Region 3 - 54, Region 5 - 153, Region 6 - 99, Region 7 - 109, Region 8 - 82) have been reported.

National (CDC [edited], November 13): During week 44 (November 1-7, 2009), influenza activity decreased slightly in the U.S. 3,834 (30.1%) specimens tested by U.S. World Health Organization (WHO) and National Respiratory and Enteric Virus Surveillance System (NREVSS) collaborating laboratories and reported to CDC/Influenza Division were positive for influenza. All subtyped influenza A viruses being reported to CDC were 2009 influenza A (H1N1) viruses. The proportion of deaths attributed to pneumonia and influenza (P&I) was above the epidemic threshold for the sixth consecutive week. Thirty-five influenza-associated pediatric deaths were reported. Twenty-six of these deaths were associated with 2009 influenza A (H1N1) virus infection, eight were associated with an influenza A virus for which the subtype was undetermined, and one was associated with an influenza B virus infection. The proportion of outpatient visits for influenza-like illness (ILI) was 6.7% which is above the national baseline of 2.3%. All 10 regions reported ILI above region-specific baseline levels. Forty-six states reported geographically widespread influenza activity, Puerto Rico and four states reported regional influenza activity, the District of Columbia reported local influenza activity, Guam reported sporadic influenza activity, and the U.S. Virgin Islands did not report.

Antigenic Characterization: CDC has antigenically characterized one seasonal influenza A (H1N1), two influenza A (H3N2) and 320 2009 influenza A (H1N1) viruses collected since September 1, 2009.

One seasonal influenza A (H1N1) virus was tested and is related to the influenza A (H1N1) component of the 2009-10 Northern Hemisphere influenza vaccine (A/Brisbane/59/2007).

Both influenza A (H3N2) viruses tested showed reduced titers with antisera produced against A/Brisbane/10/2007, the 2009-2010 Northern Hemisphere influenza A (H3N2) vaccine component, and were antigenically related to A/Perth/16/2009, the WHO recommended influenza A (H3N2) component of the 2010 Southern Hemisphere vaccine formulation.

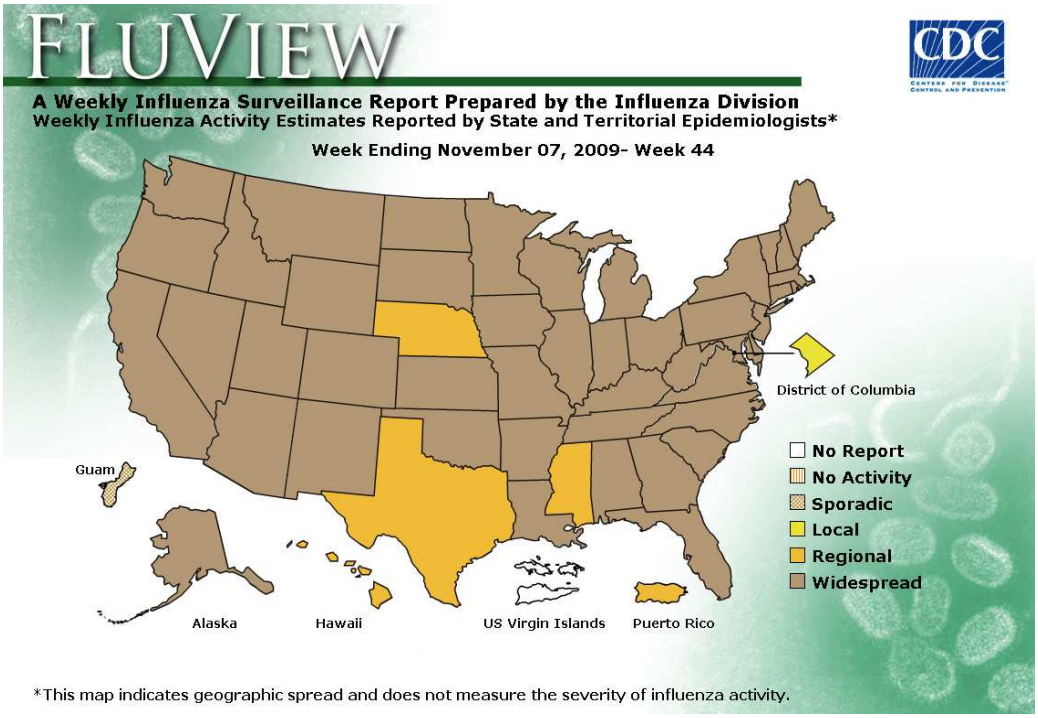
Three hundred and nineteen (99.7%) of 320 2009 influenza A (H1N1) viruses tested are related to the A/California/07/2009 (H1N1) reference virus selected by WHO as the 2009 H1N1 vaccine virus and one virus (0.3%) tested showed reduced titers with antisera produced against A/California/07/2009.

Antiviral Resistance: Since September 1, 2009, 315 2009 influenza A (H1N1) virus isolates have been tested for resistance to the neuraminidase inhibitors (oseltamivir and zanamivir), and 761 2009 influenza A (H1N1) original clinical samples were tested for a single known mutation in the virus that confers oseltamivir resistance. In addition, one influenza A (H3N2) and 152 2009 influenza A (H1N1) virus isolates have been tested for resistance to the adamantanes (amantadine and rimantadine). Additional laboratories perform antiviral testing and report their results to CDC. The results of antiviral resistance testing performed on these viruses are summarized in the table below.

Antiviral Resistance Testing Results on Samples Collected Since September 1, 2009.

	Samples tested (n)	Resistant Viruses, Number (%)	Samples tested (n)	Resistant Viruses, Number (%)	Samples tested (n)	Resistant Viruses, Number (%)
		Oseltamivir		Zanamivir		Adamantanes
Seasonal Influenza A (H1N1)	0	0 (0)	0	0 (0)	0	0 (0)
Influenza A (H3N2)	0	0 (0)	0	0 (0)	1	1 (100)
Influenza B	0	0 (0)	0	0 (0)	N/A*	N/A*
2009 Influenza A (H1N1)	1076	3†‡ (0.3)	315	0 (0)	152	152 (100)

*The adamantanes (amantadine and rimantadine) are not effective against influenza B viruses.
†Two screening tools were used to determine oseltamivir resistance: sequence analysis of viral genes or a neuraminidase inhibition assay.
‡Additional laboratories perform antiviral resistance testing and report their results to CDC. Two additional oseltamivir resistant 2009 influenza A (H1N1) viruses have been identified by these laboratories since September 1, 2009, bringing the total number to 5.



To access the entire CDC weekly surveillance report, visit http://www.cdc.gov/flu/weekly/fluactivity.htm

From http://www.cdc.gov/h1n1flu/updates/us/#totalcases:

U.S. Influenza and Pneumonia-Associated Hospitalizations and Deaths from Aug 30 – November 7, 2009

Cases Defined by	Hospitalizations	Deaths
Influenza Laboratory-Tests**	22,364	877

**States report weekly to CDC either 1) laboratory-confirmed influenza hospitalizations and deaths or 2) pneumonia and influenza syndrome-based cases of hospitalization and death resulting from all types or subtypes of influenza. Although only the laboratory confirmed cases are included in this report, CDC continues to analyze data both from laboratory confirmed and syndromic hospitalizations and deaths.

International (WHO, November 13): The level of seasonal influenza activity in most countries was low with only sporadic detections except in China where local outbreaks of H3 were reported as well as low levels of H1 and B. Sporadic seasonal influenza activity was observed in Australia (H3), Canada (H1,H3,B), China Hong Kong Special Administrative Region (H1,H3,B), Kenya (H1,H3,B), Russian Federation (H1,H3,B), Senegal (H3) and Tunisia (H3,B). Azerbaijan, Chile, Estonia, Georgia, Greece, Kyrgyzstan, Latvia, Lithuania, Serbia and Uzbekistan reported no influenza activity.

MDCH reported **WIDESPREAD INFLUENZA ACTIVITY** to the CDC for the week ending Nov. 14, 2009.

For those interested in additional influenza vaccination and education information, the MDCH *FluBytes* is available at http://www.michigan.gov/mdch/0,1607,7-132-2940_2955_22779_40563-125027--,00.html.

Avian and Novel Influenza Activity

WHO Pandemic Phase: Phase 6 – characterized by increased and sustained transmission in the general population. Human to human transmission of an animal or human-animal influenza reassortant virus has caused sustained community level outbreaks in at least two WHO regions.

National, Research (NIAID, November 16): A new study shows that molecular similarities exist between the 2009 H1N1 influenza virus and other strains of seasonal H1N1 virus that have been circulating in the population since 1988. These results suggest that healthy adults may have a level of protective immune memory that can blunt the severity of infection caused by the 2009 H1N1 influenza virus.

The study team was led by Bjoern Peters, Ph.D., and Alessandro Sette, Ph.D., of La Jolla Institute for Allergy and Immunology, Calif., grantees of the National Institute of Allergy and Infectious Diseases (NIAID), part of the National Institutes of Health.

The investigators looked at molecular structures known to be recognized by the immune system—called epitopes—on 2009 H1N1 influenza and seasonal H1N1 viruses. Viral epitopes are recognized by immune cells called B and T cells: B cells make antibodies that can bind to viruses, blocking infection, and T cells help to eliminate virus-infected cells.

Using data gathered and reviewed from the scientific literature and deposited into the NIAID-supported Immune Epitope Database and Analysis Resource (www.iedb.org), the investigators found that some viral epitopes are identical in both the 2009 and seasonal H1N1 viral strains. Those epitopes that could be recognized by two subsets of T cells, called CD4 and CD8 T cells, are 41 percent and 69 percent identical, respectively. Subsequent experiments using blood samples taken from healthy adults demonstrated that this level of T-cell epitope conservation may provide some protection and lessen flu severity in healthy adults infected with the 2009 H1N1 influenza virus.

Analysis of the database also found that among six viral surface epitopes that can bind antibody, thereby preventing infection, only one is conserved between 2009 and seasonal H1N1 viral strains.

These results suggest that healthy individuals may have immune memory that recognizes the 2009 H1N1 strain and therefore can mount some measure of an immune attack. The findings also may help explain why the 2009 H1N1 influenza pandemic affects young children more severely than it does healthy older adults and also why two H1N1 vaccinations are needed to protect children ages nine years and under.

J Greenbaum et al. Pre-existing immunity against swine-origin H1N1 influenza viruses in the general human populace. Proceedings of National Academy of Sciences. DOI: 10.1073/PNAS.0911580106.

National, Ferret (Oregon Veterinary Medical Association press release [edited], November 14): In late October 2009, a client presented 3 of 9 owned ferrets who had become ill with an influenza-like illness to a veterinarian in the Roseburg area. The family had human patients with influenza-like illness about a week prior to onset of illness in the ferrets.

Two of the 3 ferrets presented with fevers (temperature above 103 F), sneezing, coughing and had nasal discharge. Not all ferrets became ill at the same time, but 2 - 3 days after the initial 2 cases. Nasal discharge samples were collected on 27 Oct 2009 and were later reported as positive for Influenza A.

Further testing at the National Veterinary Diagnostic Laboratory confirmed the isolates as pandemic influenza H1N1. The other ferrets were not tested, but it is believed they may have had the virus as well. All 9 ferrets have recovered.

The 1st documented case of the H1N1 virus in a ferret was in a Portland, Oregon, ferret in early October [2009]. On 5 Oct 2009, a client brought a ferret to a Portland, Oregon, veterinary hospital. The ferret had been exhibiting weakness followed by sneezing, coughing, and an elevated temperature.

Because the client and her children previously had symptoms compatible with influenza, the attending veterinarian consulted with Dr. Emilio DeBess, Oregon State Public Health Veterinarian, and both agreed to test the ferret's nasal secretions for influenza.

On 8 Oct 2009, Oregon State University's Veterinary Diagnostic Laboratory presumptively diagnosed pandemic influenza H1N1 by PCR from the nasal secretions of the ferret. On 9 Oct 2009, pandemic influenza H1N1 was confirmed at the National Veterinary Diagnostic Laboratory.

Contrary to published media reports, which stated that this Oregon ferret had died, it has, in fact, recovered. Other ferrets in the US have now also tested positive for the H1N1 virus. One ferret in Nebraska died.

International, Human (WHO, November 20): The Ministry of Health of Egypt has reported a new confirmed human case of avian influenza A(H5N1).

The case is a 21 year-old male from Sedy Beshir District, Alexandria Governorate. His symptoms started on 11 November. He was admitted to Maamoura Chest Hospital on 15 November, where he received oseltamivir treatment. The patient is in a stable condition.

Investigations into the source of infection indicated that the case had close contact with dead and/or sick poultry and was involved in slaughtering sick birds.

The cases were confirmed by the Egyptian Central Public Health Laboratories.

Of the 88 cases confirmed to date in Egypt, 27 have been fatal.

Michigan Wild Bird Surveillance (USDA, as of November 20): For the 2009 testing season (April 1, 2009-March 31, 2010), HPAI subtype H5N1 has not been recovered from any of the 107 Michigan samples tested to date, including 58 live wild birds, 35 hunter-killed birds and 14 morbidity/mortality specimens. H5N1 HPAI has not been recovered from 14,023 samples tested nationwide. For more information, visit the National HPAI Early Detection Data System at http://wildlifedisease.nbii.gov/ai/.

To learn about avian influenza surveillance in Michigan wild birds or to report dead waterfowl, go to Michigan's Emerging Disease website at http://www.michigan.gov/emergingdiseases.

Please contact Susan Peters at PetersS1@Michigan.gov with any questions regarding this newsletter or to be added to the weekly electronic mailing list.

Contributors

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Table 1. H5N1 Influenza in Poultry (Outbreaks up to November 5, 2009)

(Source: http://www.oie.int/downld/AVIAN%20INFLUENZA/A_AI-Asia.htm Downloaded 11/12/09)

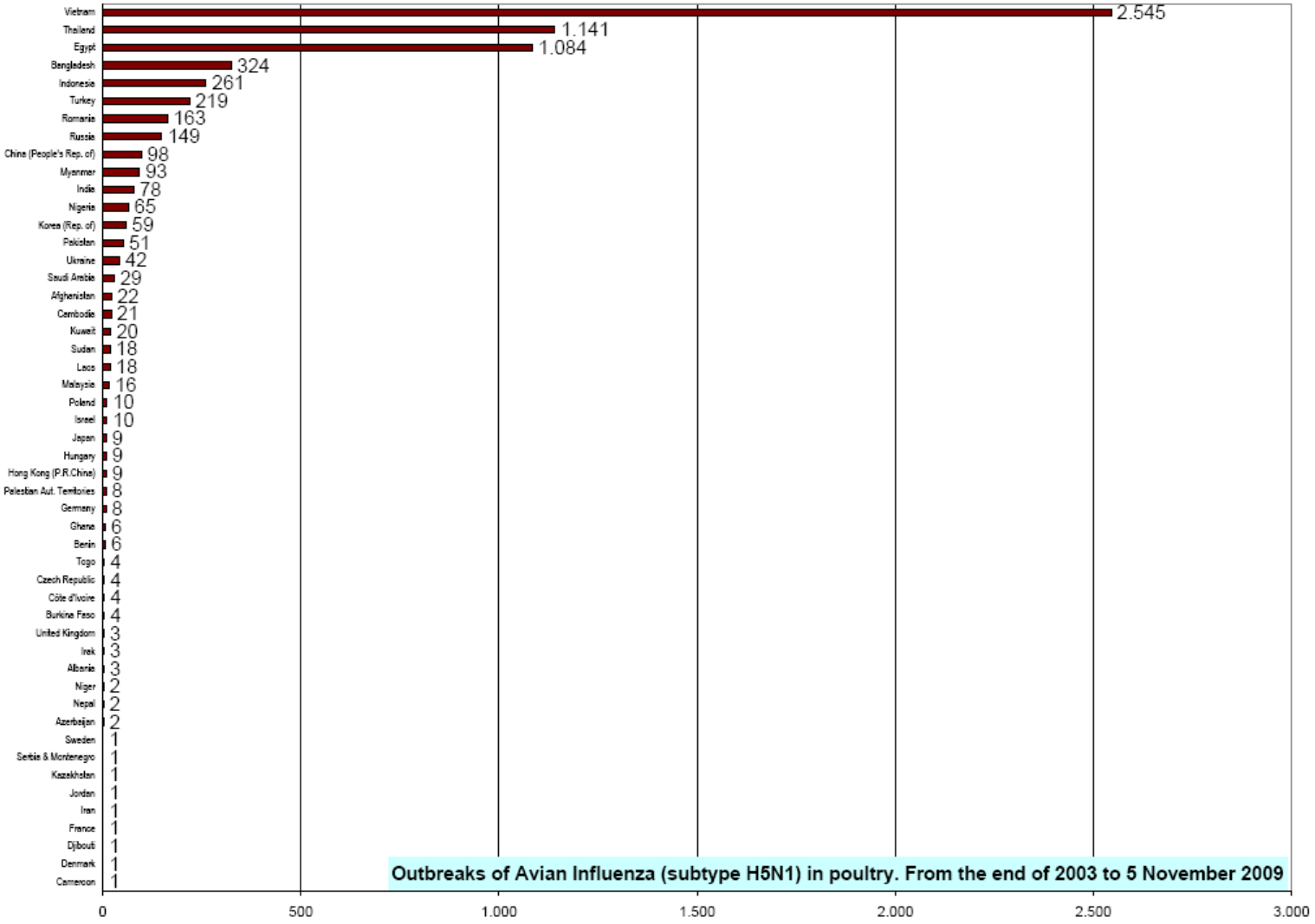

Table 2. H5N1 Influenza in Humans (Cases up to November 20, 2009)

(http://www.who.int/csr/disease/avian_influenza/country/cases_table_2009_09_24/en/index.html Downloaded 11/20/2009)

Cumulative number of lab-confirmed human cases reported to WHO. Total number of cases includes deaths.

Country	2003		2004		2005		2006		2007		2008		2009		Total	
	cases	deaths	cases	deaths	cases	deaths	cases	deaths	cases	deaths	cases	deaths	cases	deaths	cases	deaths
Azerbaijan	0	0	0	0	0	0	8	5	0	0	0	0	0	0	8	5
Bangladesh	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0
Cambodia	0	0	0	0	4	4	2	2	1	1	1	0	0	0	8	7
China	1	1	0	0	8	5	13	8	5	3	4	4	7	4	38	25
Djibouti	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0
Egypt	0	0	0	0	0	0	18	10	25	9	8	4	37	4	88	27
Indonesia	0	0	0	0	20	13	55	45	42	37	24	20	0	0	141	115
Iraq	0	0	0	0	0	0	3	2	0	0	0	0	0	0	3	2
Lao People's Democratic Republic	0	0	0	0	0	0	0	0	2	2	0	0	0	0	2	2
Myanmar	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0
Nigeria	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1	1
Pakistan	0	0	0	0	0	0	0	0	3	1	0	0	0	0	3	1
Thailand	0	0	17	12	5	2	3	3	0	0	0	0	0	0	25	17
Turkey	0	0	0	0	0	0	12	4	0	0	0	0	0	0	12	4
Viet Nam	3	3	29	20	61	19	0	0	8	5	6	5	4	4	111	56
Total	4	4	46	32	98	43	115	79	88	59	44	33	48	12	443	262